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**ARMY CORPS OF  
ENGINEERS**

**An Assessment of the  
Lower Snake River  
Dams' Draft  
Environmental Impact  
Statement**

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Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to discuss our recent assessment of the Corps of Engineers' draft Environmental Impact Statement (EIS) for the Lower Snake River dams. The Corps initiated its EIS in 1995 as a result of the listing of Snake River salmon as a threatened or endangered species under the Endangered Species Act. The Corps, which operates four dams on the Lower Snake River, evaluated the feasibility and impact of four different alternatives for improving migration conditions for salmon. These alternatives ranged from maintaining current operations to breaching the four Lower Snake River dams. This latter alternative attracted considerable attention because of the implications that breaching could have for salmon and the region.

In December 1999, the Corps released its draft EIS assessing the biological, environmental, economic, and social consequences of breaching the four dams and of the other three alternatives. The draft EIS, which cost more than \$22 million to prepare, made no recommendations about which alternative to adopt. The final EIS, which will include a preferred alternative, is not expected until 2001.

Our statement today is based on our July 2000 report, which we prepared at the request of this Subcommittee.<sup>1</sup> Our report addressed whether the Corps (1) followed applicable procedures and guidelines in preparing the draft EIS and (2) used a reasonable methodology to analyze and present the effects of breaching, specifically with respect to electricity costs, transportation costs, and air quality. As agreed with the requesters, we did not review other aspects of the draft EIS, such as the impact of breaching on salmon recovery, water quality, or recreation. Therefore, we cannot comment on the adequacy of the overall EIS, which alternative the Corps should eventually recommend, or the actions of other agencies active in salmon recovery in the Columbia River Basin.

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<sup>1</sup> Army Corps of Engineers: An Assessment of the Draft Environmental Impact Statement of the Lower Snake River Dams (GAO/RCED-00-186, July 24, 2000).

In summary, we found the following:

- The Corps conducted a comprehensive EIS process that generally adhered to the procedural requirements of the relevant federal laws and other guidelines for conducting an EIS. However, doing so did not eliminate controversy about the EIS' analysis or conclusions, even though the draft EIS made no recommendations about whether the dams should be breached.
- In our judgment, the Corps' analysis and presentation of the effects of breaching on electricity costs is reasonable; however, we could not determine the reasonableness of the Corps' estimated effects on transportation costs and air quality. For example, because breaching the dams would make the river too shallow for barge shipments, the Corps estimated that as much as \$532 million in infrastructure improvements would be needed for road, rail, and storage facilities if barge shipments ceased on the Snake River. However, the Corps assumed that these new investments would not affect the transportation cost estimate without testing the validity of this assumption or measuring the sensitivity of the transportation cost estimate to this assumption. Likewise, the Corps did not consider air quality effects from breaching on certain local populations or the effect of exposing potentially contaminated river sediments.

## **Background**

Hydropower dams on the Columbia River and its main tributary, the Snake River, provide electric power, inland navigation, irrigation, and recreation to the Pacific Northwest region. The Columbia and Snake rivers and their tributaries are also home to the salmon and steelhead that each year migrate from the Pacific Ocean to spawn in fresh water before dying. As juveniles, their young later swim back downstream to the ocean, before eventually repeating the cycle. These salmon were once abundant but have dwindled from up to 16 million a century ago to less than 1 million today. Federal agencies—including the Corps of Engineers, Forest Service, and Fish and Wildlife Service—and electricity ratepayers, through the Bonneville Power Administration (BPA),

are spending about \$400 million annually in the Columbia River Basin to reverse this decline. Salmon's decline has been attributed to many causes, among them overfishing, destruction of habitat, the introduction of hatchery-bred fish, and the presence of hydropower dams. The dams restrict the passage of salmon returning to spawn and may be especially harmful to juvenile salmon as they migrate downstream.

The precipitous decline of salmon has caused the National Marine Fisheries Service (NMFS), (within the Department of Commerce), the agency charged with protecting marine species, to list four different species of salmon and steelhead native to the Snake River as endangered or threatened under the Endangered Species Act. That act requires federal agencies whose actions affect the survival of endangered or threatened (listed) species to manage their activities to avert the species' extinction. In a response to a determination by NMFS that the Corps of Engineers' hydropower operations jeopardize salmon's survival, the Corps, which operates four hydropower dams on the lower Snake River, began a feasibility study in 1995 of how to improve migration conditions for juvenile salmon. Under the EIS, the Corps is evaluating four alternatives, one of which involves breaching the four dams (removing the earthen portion of the dams and allowing the river to course around the remaining concrete structures). The other alternatives are to (1) maintain current operations, (2) increase the transportation of juvenile salmon around the dams, or (3) make improvements to the dams' systems for collecting juvenile salmon and barging or trucking them past the dams. Because substantial changes in the dams' operations could have significant environmental consequences, the Corps must also adhere to the National Environmental Policy Act (NEPA) and prepare an EIS as part of the feasibility study. NEPA's guidelines provide a roadmap for decision-making in cases where major federal actions may have environmental consequences, such as significant changes in dam operations. Breaching the dams is the alternative that would have the greatest impact on the region and is highly contentious. It could help salmon, but it would also eliminate a source of hydroelectric power and a waterway for barge transportation to ports 140 miles upstream.

The four Lower Snake River dams (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite) are very similar. In total, they produce about 1,250 average megawatts per year, which is about 5 percent of the total electricity generated in the Pacific Northwest. The dams do not provide flood control and only limited irrigation. Each of the four dams is about 100 feet high and between 2,655 and 3,791 feet wide. Each consists of an earthen embankment that would be removed and a concrete structure consisting of the locks, spillway, and powerhouse that would be mothballed, if the dam is breached. The Corps has estimated the total construction cost to breach the four dams to be about \$900 million. All four have fish ladders for upriver migration for salmon returning to spawn and a bypass system for the downriver migration of juvenile salmon.

The Corps' recommendation in the final Snake River EIS will be part of a comprehensive plan to reverse the decline of salmon throughout the Columbia River Basin. For example, NMFS has also listed eight other salmon and steelhead stocks in the Columbia River Basin, fish that do not have to pass through the Snake River dams. In July of this year, NMFS released a new draft biological opinion for the Federal Columbia River Power System.<sup>2</sup> The draft opinion is part of federal agencies' proposed long-term strategy for salmon recovery in the region. This strategy does not envision breaching the dams at this time, though agencies will undertake engineering and other studies for potential breaching in the event other recovery efforts do not meet pre-established recovery goals.

### **Development of Corps' Draft EIS Followed Procedural Requirements and Guidelines**

The Corps of Engineers generally followed procedural requirements and guidelines in developing its draft EIS. These requirements are contained in NEPA and accompanying regulations, which provide a framework for decision-making in cases in which major federal actions may have environmental consequences. While the Corps adhered to

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<sup>2</sup> Under the Endangered Species Act, federal agencies, such as the Corps, whose activities could affect the survival or recovery of endangered and threatened species or their critical habitat are required to prepare a biological assessment of the impact their actions may have. The Secretary of the agency responsible for conservation of the species, (NMFS in the case of marine species) responds with a biological opinion that identifies reasonable and prudent actions that the agency needs to take to protect the listed species.

these broad requirements and guidelines in preparing its draft EIS, EPA and other affected parties have challenged some aspects of its analyses and conclusions. In particular, the Environmental Protection Agency (EPA) has challenged the Corps' findings in regard to water and local air quality.

Under NEPA regulations, federal agencies are required to compile and develop accurate scientific information on a range of alternatives, obtain expert advice from other agencies, and allow public comment on the alternatives before making decisions with environmental consequences. NEPA lays out a general process for achieving these goals but leaves agencies with considerable latitude in deciding exactly how to develop an EIS.

While NEPA does not dictate the scope of an EIS, the scope of the Corps' draft EIS is substantial. The geographic scope of the draft EIS generally focuses on the 140-mile long stretch of the Lower Snake River between Lewiston, Idaho, and the Tri-Cities area (Pasco, Richland, and Kennewick) in southeastern Washington. Within this area, the draft EIS examines the impact of each of the four alternatives across a comprehensive range of possible effects, including biological analyses of salmon and steelhead; electric power generation and facilities; transportation via navigation, railroads, and highways; air quality; water quality and hydrology; and other physical and economic effects.

The Corps' procedures for preparing the draft EIS were generally consistent with NEPA and the agency's implementing guidance. In accordance with NEPA's requirements, the Corps involved other federal agencies, consulted with affected Indian tribes, involved other stakeholders and the public, and sought outside technical review.

Procedural adherence to NEPA and other guidance by the Corps has not been sufficient to ensure agreement with the EIS by others. The draft EIS has been challenged by other agencies and affected parties that disagree with the analysis or conclusions. EPA is the most noteworthy of these critics because of its responsibilities under NEPA and the Clean Air Act to review and comment on all environmental impact statements. In comments provided to the Corps in April 2000, EPA rated the draft EIS as inadequate

because it did not adequately assess potentially significant impacts on water quality and was incomplete in its review of air quality.

### **Corps' Analyses of Electricity, Transportation, and Air Quality Vary in Quality**

Breaching the dams would mean losing both the hydroelectric power generated by the dams and barge shipments on the Lower Snake River. Breaching would also affect air quality by increasing dust in the air and adding airborne pollutants from substitute sources of power and transportation. The Corps' analysis and presentation of the effects of breaching on electricity costs is reasonable; but its transportation cost estimate and its air quality analysis are insufficiently developed to determine whether they are reasonable.

#### Estimated Effects on Electricity Costs Are Reasonable

The Corps' estimates of the costs associated with losing hydropower from the four dams are reasonable and are supported by multiple analyses and by outside reviewers. The Corps generally adhered to accepted guidelines, economic principles, industry practices, data sources, and modeling techniques. The process was also open to public participation, and stakeholders representing widely divergent views on the future of the dams generally were satisfied with both the process and quality of the estimates.

Breaching the four dams on the Lower Snake River would raise the net cost of electric power supplies in the western United States by \$245 million annually. According to the draft EIS, this could increase the average electricity bill for households in the Pacific Northwest by \$1.20 to \$6.50 per month, while large users, such as aluminum companies, could see monthly increases approaching \$1 million. However, the EIS also notes that if the electric industry becomes more competitive, BPA, which transmits and markets power created by the dams, may not be able to raise rates to recover higher costs.

The power system cost estimates are supported by multiple analyses that yielded similar results. Three different organizations—the Corps, BPA, and the Northwest Power

Planning Council—conducted parts of the analysis, using different approaches to estimate the impact of breaching the four dams on the cost of electric power supplies.

The electricity cost estimate resulted from an open process with active participation by stakeholders representing a spectrum of views on the question of the dams. The results of the analysis generally met with the approval of these stakeholders. These stakeholders included environmentalists, Native Americans, and other advocates of free-flowing rivers, as well as industrial users that are heavily dependent on inexpensive hydropower from dams. Each of these groups participated on the team that developed and reviewed the initial estimates. Representatives of these groups with whom we spoke were generally satisfied with both the process followed and the quality of the cost estimates. The Council's Independent Economic Analysis Board also reviewed the Corps' methodology and analysis. The Board found that the Corps used sophisticated models and accepted methods and that the results can be relied on as a reasonable representation of the economic effects.

There are two concerns with the cost estimation and presentation of the effect of breaching on power costs, but these are not material to the Corps' estimate. First, the power cost estimate assumes that the demand for power will not be affected by higher rates charged for electricity.<sup>3</sup> An earlier study developed by the Corps, BPA, and the Bureau of Reclamation reported that a rate increase necessary to cover increased costs for replacement power would reduce the demand for power and thereby reduce the cost estimate for power by less than 10 percent. However, Corps, BPA and Council officials told us that they did not model the relationship between electricity rates and the demand for electricity because it would have required considerable cost and effort without having a significant effect on the results. The second concern is presentational. The draft EIS does not subtract \$26 million of avoided costs of operating and maintaining the dams if they are breached from its annual power cost estimate. Instead, the draft EIS

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<sup>3</sup> The Corps' draft EIS assumes zero price elasticity of demand. Price elasticity of demand is the relative change in quantity demanded divided by the relative change in price. In this case, zero price elasticity of demand means that a rate increase will not change the quantity demand.

reports an annual power cost estimate of \$271 million and, elsewhere in the EIS recognizes the avoided costs of not operating the dams. However, by not including avoided costs in the power cost estimate, the draft EIS conveys a greater effect on electricity costs than may actually occur. Corps officials said that the overall net cost for all economic effects is more important than understanding the net power system costs, and that is why they did not subtract the avoided costs from their estimate.

#### Transportation Cost Estimate Needs Further Development

The draft EIS' overall approach to computing the costs of breaching the dams on the current river transportation system is generally reasonable. However, the Corps' analysis and presentation did not fully consider the effect of possible changes in some key but uncertain assumptions. We could not determine whether further investigation of the validity of its assumptions would materially affect the Corps' final estimate.

The Corps estimated that breaching would increase shipping costs for all commodities by \$21 million each year over the next 100 years. A key assumption the Corps made in arriving at this estimate is that infrastructure improvements needed to replace barge transportation would not add to the transportation cost estimate. However, the Corps did not sufficiently test the sensitivity of the transportation cost estimate for this assumption. The draft EIS estimates that the infrastructure improvements needed to replace barge transportation—including such things as new grain elevators farther downstream on the Columbia River, highway improvements, new rail cars, and track improvements—will cost between \$207 million and \$532 million. However, the draft EIS assumes that these infrastructure improvements can be absorbed by the transportation sector without affecting their long-run costs. The Washington State Department of Transportation and the Independent Economic Analysis Board contend, however, that making these improvements could increase transportation costs, perhaps significantly. Corps officials are considering these and other comments and have not completed their responses.

Another uncertainty arises from the Corps' assumption that estimated shipping costs provide a better estimate of actual costs than do published shipping rates. Applicable guidelines recommend using published rates to estimate transportation costs unless these rates are not competitively established.<sup>4</sup> Corps officials stated that published rates were not used because barge operators have limited competition and can charge rates that are higher than competitive rates. Barge representatives told us that their rates are competitive and have been used in other studies of Columbia and Snake River shipping. The Corps did not test the sensitivity of its transportation cost estimate to using published rates instead of estimated costs.

#### Estimated Effects on Air Quality Are Incomplete

The Corps' air quality analysis is incomplete because it did not assess how local air quality or human health would be affected if the dams were breached and did not consider the effects of all relevant pollutants. The draft EIS' air quality analysis estimated the gross increase in air emissions resulting from replacement power generation, increased truck and rail transportation, and airborne dust from dam deconstruction and exposed reservoir sediments across the entire region. The Corps concluded that the combination of these air quality components would not have a significant regional effect. However, the Corps did not examine certain pollutants, such as chemicals in the reservoir sediments. The Corps also assumed the emissions that were studied would be equally distributed across the region, instead of being concentrated in specific locations, possibly affecting local air quality and human health. To identify these more localized effects, EPA, the agency responsible for reviewing and commenting on all environmental impacts of federal activities, has requested that the Corps complete a more thorough analysis.

The Corps' draft EIS reported that breaching the dams would have some effects on air quality during the breaching process, as well as from changes in the river level and transportation and power generation practices after the dams are breached. For

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<sup>4</sup> The Corps followed the Water Resources Council's *Economic and Environmental Principles for Water and Related Land Resources Implementation Studies* (1983), which specifies guidelines for evaluating

example, the draft EIS reports that replacement power generation would increase emissions of carbon monoxide and carbon dioxide, while deconstruction of the dams and the resulting exposed reservoir sediment would contribute to an increase in particulate matter.

The Corps' air quality assessment was incomplete because it did not consider the impact of breaching on local air quality and human health and because it omitted from the study certain pollutants, such as chemical contaminants in reservoir sediments, that would be exposed as a result of breaching. In some cases, the Corps compared the changes in emissions across a wide geographic area but did not consider concentrated local impacts. For example, the draft EIS estimated that the loss of barge transportation would lead to a decrease in total emissions from carbon monoxide, nitrogen dioxide, and sulfur dioxide. However, this summary view masks increased emissions from trucks hauling grain that is likely to occur in certain areas of eastern Washington State. According to the draft EIS, the elimination of barging is expected to result in 223 additional trucks per day and their accompanying emissions in the Tri-Cities area. The draft EIS also reported that reservoir sediments contain heavy metals and DDT, but the Corps did not perform the dispersion modeling necessary to determine whether they could pose a threat to human health.

Difficulties with the Corps' air quality analysis can be attributed, in part, to the Corps' getting a late start on the analysis. Initially, the Corps did not include an air quality assessment within the scope of the EIS. Corps officials stated that they did not believe it was a significant issue for this EIS and planned to incorporate a 1995 air quality assessment. However, in April 1998, following discussions with BPA and others, the Corps, using input from EPA as a cooperating agency, initiated a new air quality segment as part of the Corps' scope of work. Nevertheless, the Corps did not complete significant portions of its original air quality scope of work, including an assessment of the direct and cumulative effects on air quality, because several of the tasks included in the scope of work could not be done for the cost or time allotted, according to Corps and

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national and regional economic effects.

contractor officials. In order to meet budget and time constraints, the Corps reduced the work plan. The Corps and EPA are currently negotiating the additional analysis that the Corps will perform for its final EIS.

The Corps is currently revising its draft EIS in consideration of public comments and assessments of its draft EIS performed by us and others. It is essential, given the controversy and importance of this issue, that the Corps provides sufficient analysis and information to support its recommended alternative to policymakers and the public.

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Mr. Chairman, this concludes our prepared statement. We would be pleased to respond to any questions you or the Members of the Subcommittee may have.

Contact and Acknowledgement

For future contacts regarding this testimony, please contact Derek B. Stewart on (202) 512-3841. Individuals making key contributions to this testimony include Paul Aussendorf and Bill Swick.

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